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CARBIDE AND CARBON CHEMICALS CORPORATION
PROCESS DIVISION

CHEMICAL OPERATIONS DEPARTMENT PROGRESS REPORT-MONTH OF JANUARY, 1948

INVENTORY
PLANT RECORDS DEPT.
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W. C. Hartman

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By W. C. Hartman

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CHEMICAL AREA:

Fluorine Plant:

The generators were frozen down during the first ten days of January. When the steam was again turned on and the generators started, considerable operational difficulties were encountered. The cells could not be operated at the optimum amperage load without the voltage becoming excessive. Samples taken on the electrolyte indicated that the HF content was correct. However, it was noticed that the electrolyte samples were unusually clear instead of having the usual milky appearance. The anodes were removed and the electrolyte was stirred until no more solid remained on the bottom of the cells. When this was completed, the electrolyte resumed its normal milky appearance. The anodes were replaced and the generators were placed in operation. No operational difficulties occurred in the start-up, the amperage and voltage assuming their normal operating values.

No definite conclusion as to why this phenomenon occurred was reached; however, it is believed that the LiF crystallized out of solution during the freeze-down period of the electrolyte and settled on the bottom of the cell. Laboratory samples partially substantiate this belief since the LiF content in the electrolyte before mixing was 0.17% and after mixing was 0.8%. Further freeze-down tests are expected to provide more information in the future.

Nitrogen Plant:

4,367,248 cubic feet of nitrogen was distributed from the K-1408 plant during the month of January 1948.

Mercury Recovery Unit:

176 pounds of triple distilled mercury were produced during January 1948.

Freon Recovery Unit:

214 pounds of Freon were recovered during January with a percent weight loss of 2.7%.

Oxide Conversion Unit:

The oxide conversion had a greater production of TF_6 during the month of January 1948 than for any month of 1947 and at the same time used less fluorine per gram of TF_6 produced. The January production was 72,838 grams of TF_6 which exceeded the average of 63,864 grams for the months that the unit operated during 1947. The fluorine consumption for January 1948 was 105 pounds which was less than the 1947 average of 128 pounds per month.

Oxide Conversion Unit: (Cont'd.)

The fundamental operating principles have not been changed but progress has been made towards overcoming operational difficulties and towards approaching the theoretical efficiency peak. The weight of charges on individual runs has been increased gradually with a slight increase in fluorine flow when the reactors are operating in series. The goal is to reach the balance or optimum point of "F" recovery efficiency, fluorine efficiency, and TF_6 production.

A new system of reusing cylinders and condensers has been placed in service. The system omits the decontaminating, reconditioning, and re-tare weighing of the cylinders and condensers unless the "I" content of the material is changed.

Decontamination Unit:

During the month, approximately 4,000 items have been decontaminated. From a total of 2,159 coveralls checked for alpha contamination, 74 pairs were found to be contaminated.

Many changes were made on the stainless steel acid spray tank. In order that more flow of acid might be obtained, useless restrictions such as the filters, excessive 90° angles, and small pipe were eliminated. To prevent oxides of nitrogen fumes from escaping, a heavy angle iron lip was welded to the tank and the underside of the lid braced with two stainless steel angle iron runners. A thick sponge rubber gasket was installed on the lid to fit the angle iron lip on the tank.

Plexiglass sight windows were installed on the ends of the tank. Beneath these windows, provisions were made by means of rubber gloves to handle the probes and equipment inside the tank, from outside the tank. Fluorescent lights over each window enable personnel to see the inside of the tank. An acid filling line was installed which also serves as a damper when venting the tank. A blower was installed to vent the NO_2 fumes to the roof before the lid is removed from the tank.

Several runs have been made on various contaminated equipment using the spray tank. It was found that in general, rough surfaces containing imbedded TF_6 could not be cleaned with the acid spray. Production runs were made using an acid solution having a pH of less than 0.9 and limiting the time duration to one hour. After each run, it was necessary to add 25 to 65 pounds of 70% nitric acid to reduce the pH to specifications. Use of the probes seemed to help in "knocking off" TF_6 on parts of equipment that were not subjected to heat or friction. One decontaminated seal returned to the Seal Shop was reported to be non-usable since the shaft clearance had increased .010" due to the acid reaction.

Production Tables:Fluorine:

Produced	337 pounds
HF used	530 pounds
Distribution	
Oxide Conversion Unit	105 pounds
K-300 Area	188 pounds
K-1400 Area	12 pounds
Laboratories	2 pounds
Total	307 pounds

Nitrogen:

Received	4,550,400 cubic feet
Distribution	
As L-28	2,616,172 cubic feet
As G-74	1,565,779 cubic feet
Evaporation	175,297 cubic feet

Oxide Conversion:

Wt. oxide charged	63,769 grams
"T" content in oxide	48,253 grams
Wt. ash charged	10,954 grams
"T" content in ash	5,520 grams
Wt. F ₂ used	47,532 grams
Wt. TF ₆ produced	72,838 grams
"T" content in TF ₆	49,246 grams
F ₂ content in TF ₆	22,556 grams
Wt. ash produced	12,830 grams
"T" in ash	5,091 grams
% "T" efficiency	91.5%
% F ₂ efficiency	47.4%

Water Media Recovery:

	<u>Received</u>	<u>Shipped</u>	<u>In Process</u>
T ₂ O ₃ Class B		44,597.5 gms.	
Solutions, Class B	4,047.0 liters		
Solutions, Class C	4,837.9 liters		2,270.0 liters
Crude Initial Filter Cake			
Class B		97,796.1 gms.	
Class C		5,125.7 gms.	
Filtrate, Class B		1,438.2 liters	
Wash Water, Class B		1,466.7 liters	

Production Tables: (Cont'd.)C-2144 and MFL Oil Recovery:

<u>Material</u>	<u>Starting Inventory</u>	<u>Received</u>	<u>Shipped</u>	<u>Ending Inventory</u>	<u>Recovery Loss</u>
MFL	229.1	55.8	177.5	90.8	16.6
C-2144	50.0	52.7	49.8	52.7	None
C-2144, Class M	None	384.0*	291.0*	0.0	93.0*
MFL Dry Filter Cake					
Class C	9.8	---	9.8	None	
Class A	None	---	18.3	None	
Class M	None	---	22.4	None	
MFL Wet Filter Cake					
Class M	23.4	---	---	None	
Class C	8.3	---	---	None	
C-2144 Dry Filter Cake					
Class M	None	---	41.0	None	
MFL & Carbon Tetrachloride					
Class M	---	---	None	276.0	
MFL & Freon					
Class A	---	---	None	23.0	
C-2144 & Freon					
Class M	---	---	None	22.0	

* This oil was received from the Coded Chemicals Department for filtering only. This oil actually turned out to be a mixture of Freon and oil (mostly oil). The Freon was lost when the oil was placed in the reactors to heat the oil sufficiently to make its viscosity less for better filtration. Therefore, approximately 90% of the 93.0 pounds loss was Freon 113.

In the Received column, 52.7 pounds of C-2144 is shown. This oil was uncovered during the month when cabinets belonging to Design and Development were cleaned out. Agreement was reached to Design and Development to acquire the C-2144 without charge.

CASCADE SERVICES DEPARTMENT:Leak Testing:

	<u>Service Calls</u>	<u>Cells</u>	<u>Cell C-816 System</u>	<u>Misc.</u>	<u>AC Pumps</u>	<u>Prod. Cyls. and Heads</u>
Vacuum Testing	14	-	3	9	-	359
Pressure Testing	12	1	4	2	5	359
CO ₂ Testing	1	-	-	-	12	-
C-816 Testing	15	-	153	-	-	-

CASCADE SERVICES DEPARTMENT: (Cont'd.)

Special Materials Handling:

	Service					Rec'd.	Issued	AC	Spills	Excess	Truck
	Calls	Cells	Misc.	Chg'd.	Dischg'd.	(lbs)	(lbs)	Pump	PG Oil	Alpha	Service
C-216											
Charging - -	11	10	1	-	-	-	-	-	-	-	-
C-616											
Charging - -	2	8	-	-	8 cyla.	-	-	-	-	-	-
Carbon & Al. Traps - -	10	-	-	22	22	-	-	-	-	-	3
Field Decontam. - -	155	-	11	-	-	-	-	5	16	5	73 55
C-816											
Storage - -	4	-	-	-	-	853.5	74.25	-	-	-	4

General Service:

	Service		Valves	Valves			
	Calls	Coolers	Purged	Buffered	Plant I	Plant II	Plant III
C. C.							
Backwash - -	-	-	-	-	-	-	-
Purge & Buffer - -	4	-	16	20	-	-	-
Airborne Alpha Surv. - -	22	-	-	-	-	-	-

Usage of L-28 and Dry Ice: (Received)

	L-28		Dry Ice (50-Lb. Blocks)
Location	60-Gal. Dollies	Carboys	Wet Ice Trichlorethylene
Plant I	-	88 (100 liter)	462 1-55 Gal. Drum
Plant II	99	-	775 1-55 Gal. Drum
Plant III	155	-	751 1-55 Gal. Drum
Totals	15240 Gal.	2323 Gal.	99400 Lbs. 165 Gallons.

Usage of L-28 and Dry Ice: (Delivered)

	L-28 Carboys		Dry Ice
Location	60-Gal. Dollies	25 ' 100 ' Bags	Trichlorethylene
L.R. Stations (31)	195	-- 83	1621.5 268.5
P.W. (K-306-7)	59	22 --	52 5
K-312-3 Cold Trap	--	-- --	2 4.5
K-402-4 Pipe Gallery	--	5 --	50 --
K-311-1 Field Lab.	--	-- --	39 --
Vacuum Test	--	12 --	-- --

CASCADE SERVICES DEPARTMENT: (Cont'd.)Usage of L-28 and Dry Ice: (Delivered) (Cont'd.)

Location	L-28 Carboys			Dry Ice	
	60-Gal. Dollies	25	100	Bags	Trichlorethylene
K-301-4 Inst. Shop	--	45	--	54.5	2
K-303-7 Inst. Shop	--	72	--	49.5	6
K-305-9 Inst. Shop	--	59	--	50	4
K-1024	--	--	--	6	--
K-413	--	--	--	7.5	--
Miscellaneous*	--	--	--	35	2.5
Totals	13963 Gal.	1419	2181	19670	292.5 Gal.
		Gal.	Gal.		

* 131 Building, K-305-9 Cell Floor, K-305-8 Cell Floor, K-306-1 Portal.

PROCESS LABORATORY:

There were 1,564 laboratory samples taken during the month of January 1948, of which 862 determinations were made. In addition, 93 carbon traps were scanned and 46 special air samples taken.

A new type dew point chamber has been developed that has several advantages over the ones previously used. The new type chamber equipment requires fewer adjustments and discourages any tampering with the equipment which might affect the calibration. Four such chambers have been placed in service.

In addition to the new chamber, a dew point meter that will obtain dew points on low pressure system such as the seal exhaust system has been constructed and tested with satisfactory results.

RADIATION MONITORING:

The Radiation Monitoring Section was organized during the last week in December. During January, the radiation monitoring program was developed and assignments were made.

The weekly routine monitoring assignments are as follows:

K-1301	Monitored on Monday, Wednesday, and Friday
K-1303	Monitored on Monday, Wednesday, and Friday
K-1405	Monitored on Monday and Wednesday
K-1401 Safety Equipment	
Decontamination Area	Monitored on Tuesday
K-1401 Pump Shop	Monitored on Tuesday and Thursday
K-1004-D	
Rooms 5, 12, 8, 11, and 21	Monitored on Thursday

C-O-N-F-I-D-E-N-T-I-A-L

-8-

RADIATION MONITORING: (Cont'd.)

In addition to the routine monitoring, 14 air samples were taken at the K-306-7 P.W. station, 66 air samples and surface readings taken on pump changes, seal changes, etc., and surface readings taken on 24 excess property trucks. 82 film badges were distributed each week.

FLUOROTHENE PLANT:

All construction of the Fluorothene Plant with the exception of some insulating and painting has been completed. It is estimated that the insulating work will be completed by the middle of February and the painting will be finished a few days later.

An analyst has been assigned to the plant laboratory. His time has been occupied in equipping the laboratory with necessary apparatus and learning the various procedures which will be followed during normal operations. A chemist, loaned by Linde Air Products Corporation has been assisting with the procedures training.

W. C. Hartman

W. C. Hartman
Chemical Operations Department

C-O-N-F-I-D-E-N-T-I-A-L